



A.D. 1837 N^o 7335.

S P E C I F I C A T I O N

OF

HENRY BOOTH.

STEAM-BOILER FURNACES.

LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,

PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:

PUBLISHED AT THE GREAT SEAL PATENT OFFICE,

25, SOUTHAMPTON BUILDINGS, HOLBORN.

Price 6d.

1855.



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Steam-Boiler Furnaces.

BOOTH'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, HENRY BOOTH, of Liverpool, in the County of Lancaster, send greeting.

WHEREAS His late most Excellent Majesty King William the Fourth, by His Letters Patent under the Great Seal of Great Britain, bearing date the
5 Fourth day of April, in the seventh year of His reign, did, for Himself, His heirs and successors, give and grant to me, the said Henry Booth, His especial licence that I, the said Henry Booth, my exors, admors, and assigns, or such others as I, the said Henry Booth, my exors, admors, and assigns, should at any time agree with, and no others, from time to time and at all times during the
10 term of years therein expressed, should and might make, use, and exercise and vend, within England and Wales, and the Town of Berwick-upon-Tweed, my Invention of "IMPROVEMENTS IN THE CONSTRUCTION OF LOCOMOTIVE ENGINE-BOILER FURNACES, APPLICABLE ALSO TO OTHER FURNACES;" in which said Letters Patent there is a proviso obliging me, the said Henry Booth, by an instru-
15 ment in writing under my hand and seal, particularly to describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, and to cause the same to be enrolled in His Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said recited Letters Patent, as in and by the same, reference
20 being thereunto had, will more fully and at large explain.

NOW KNOW YE, that in compliance with the said proviso, I, the said Henry Booth, do hereby declare that the nature of my said Invention, and the manner in which the same is to be performed, are described and ascertained as follows, that is to say :—

Booth's Improvements in Steam-Boiler Furnaces.

My improvements in the construction of locomotive engine-boiler furnaces consist in an arrangement by means of which the fuel may be conveniently introduced into the furnace under the fire-door by a long and narrow apperture extending the whole width of the furnace, instead of, as usual, through the furnace door, conjoined with such an adaptation of the fire-bars, and of a coal-box or feeding apparatus behind as shall give efficiency to the said arrangement, all which will be fully explained and rendered intelligible by reference to the several Figures hereunto annexed, the said Figures being drawn on a scale of half an inch to a foot, the proportions, however, not being limited strictly to these dimensions. N.B.—The same letters denote the same parts in whichever 10 Figure they occur.

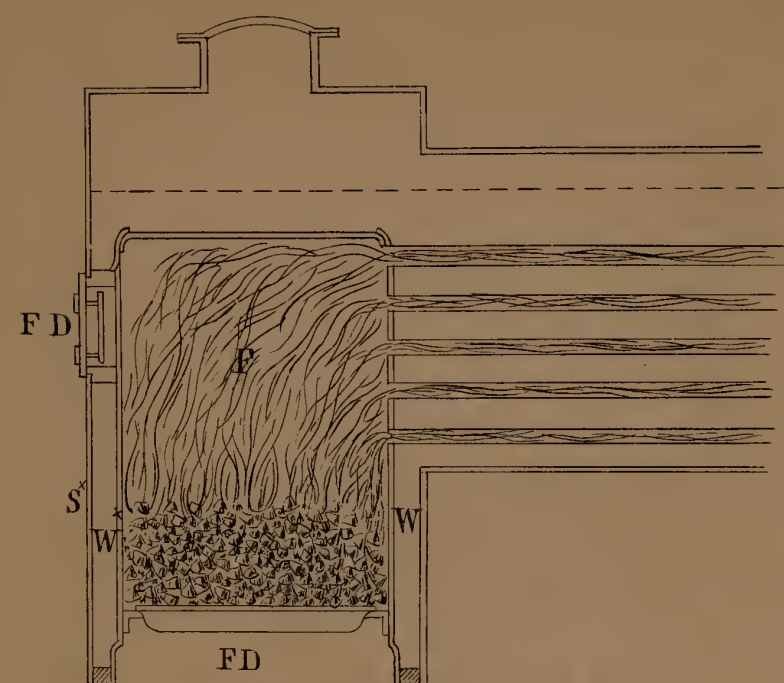
Figure 1 represents in section, through the middle, a side view of a locomotive boiler furnace as hitherto commonly constructed.

Figure 2 shews the improvements of construction which are to be hereby explained, also exhibited in longitudinal section (it being understood that the 15 length of a locomotive furnace means the extent of it in that direction which corresponds with the length of the whole boiler, whatever the dimension of the furnace may be crossway compared with the longitudinal dimension). F is the furnace; F, D, is the fire-door at the back of the furnace; F, B, is a fire-bar; W is the water space surrounding the sides and ends of the furnace, except the fire- 20 door, which is about one foot square in area; C is a close square-sided coal-box of the same width as the furnace, with a door behind, and may be made of forged iron plates, and attached to the back part of the ordinary furnace; P is an iron plate, forming the bottom of the coal-box, and placed in an inclined position, in order the more easily to supply the fire with the fuel. 25 The lower edge of this plate rests on the same cross bearer which supports the upper end of the fire-bars.

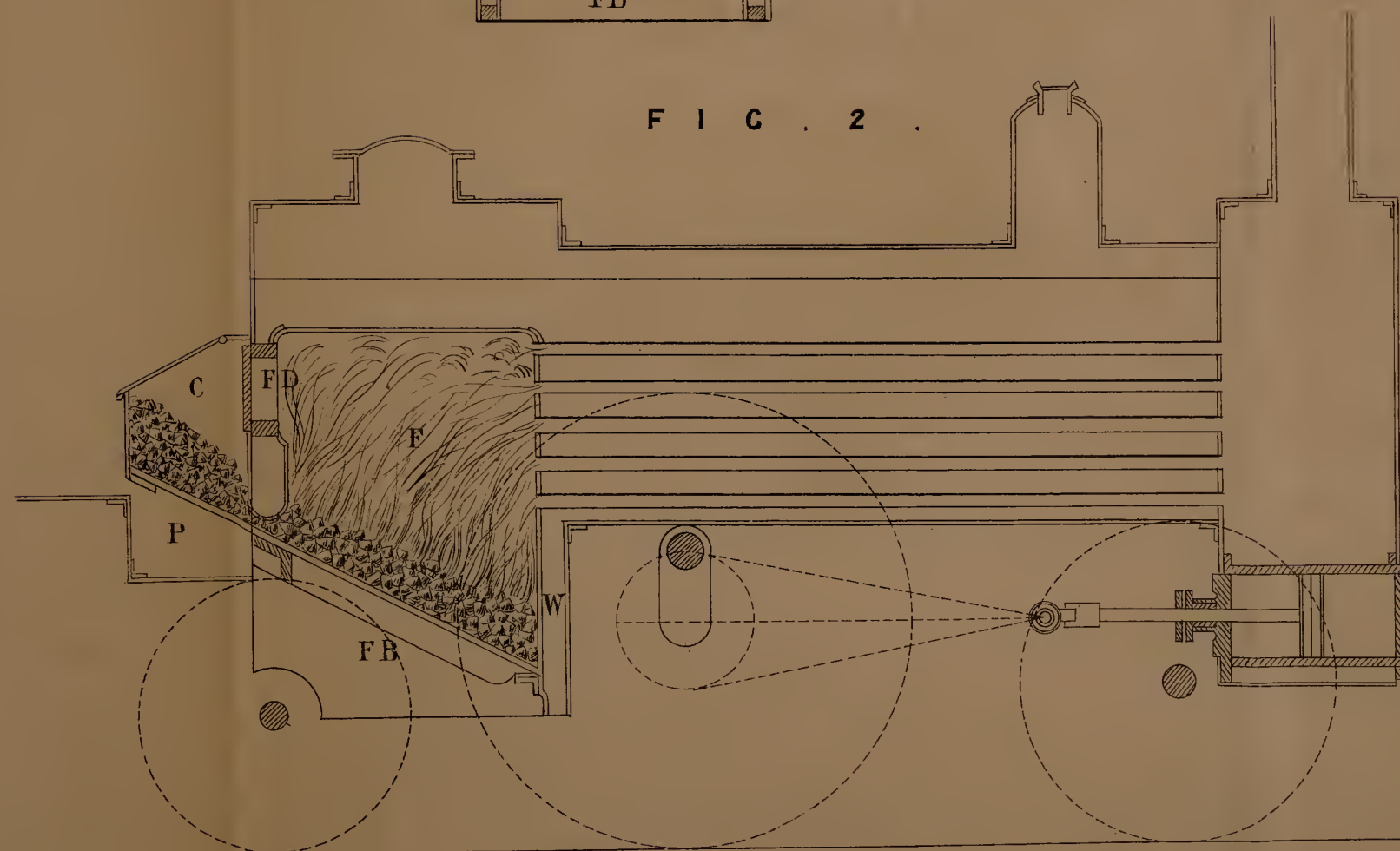
Figure 3 shews the plan of the said iron plate, on which the coals rest; the narrow slits or apertures at the bottom, (the same being about half an inch wide and about six inches long, and inch and a half asunder,) being for the 30 purpose of admitting the short teeth or prongs of a pushing rake, by the use of which underneath the coal may be made to pass from the lower part of the coal-box, under the outer casing at the back of the fire-box (S), into the furnace in such quantities as may be found desirable.

By an inspection of Figure 2 it will be seen that part of my improvement 35 consists in cutting off and detaching the lower portion of the back part of the furnace, from about six inches below the furnace door, the whole width of the fire-box, in order to introduce the fuel in the proposed improved method.

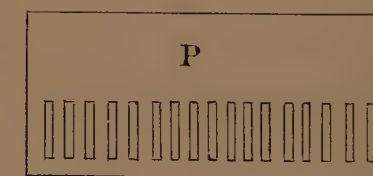
F I G . 1 .



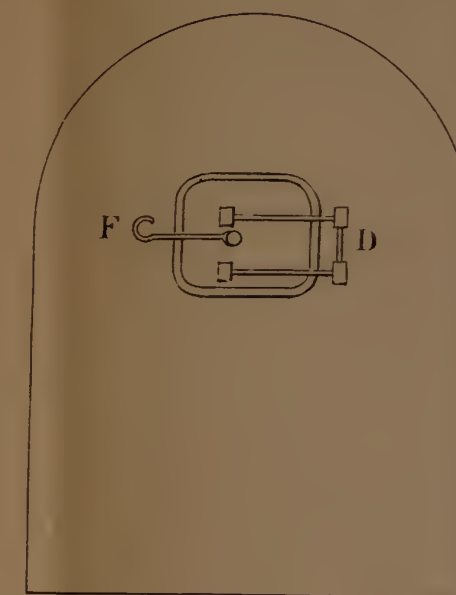
F I G . 2 .



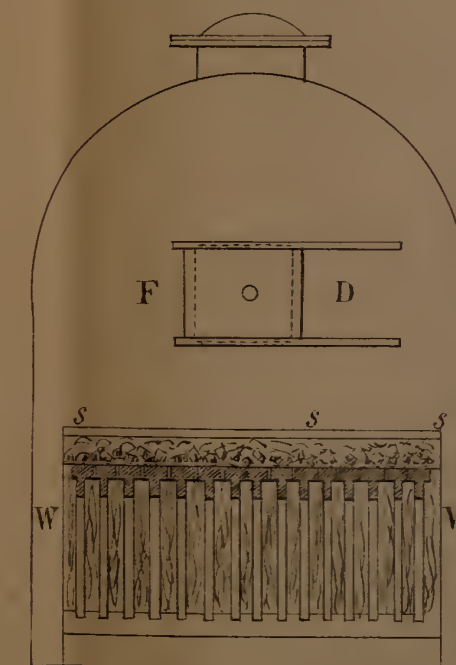
F I G . 3 .



F I G . 4 .



F I G . 5 .



Scale of $\frac{1}{2}$ Inch = 1 foot.

Drawn on Stone by Malby & Sons.

The enrolled drawing is colored.

Booth's Improvements in Steam-Boiler Furnaces.

Figure 4 exhibits an end or back view of the exterior of a locomotive furnace of the ordinary construction.

Figure 5 is a furnace (but without the coal-box attached) of the improved construction, shewing the position of the coals as they are introduced between
5 the fire-bars or coal-plate and the bottom of the water space or outer casing, about six or nine inches below the fire-door. S, S, S, the spot at which a portion of the back of the furnace is cut off and detached to admit of this arrangement.

Now the manner of using this improved apparatus is as follows:—The
10 coal, &c. in the first place, for the purpose of lighting the fire, may be introduced in the ordinary way through the furnace door, (the coal-box door, which should be double the size of the furnace door, being open for the purpose). When the furnace is charged with coal or other combustibles in the ordinary way, the coal-box must also be charged with coal, as exhibited in
15 Figure 2, and afterwards must be constantly kept filled up a few inches above the bottom of the water space or outer casing under the fire-door along the whole width of the furnace. When the coal is fully ignited in the furnace, if the engine is in motion, the shaking of the boiler furnace and coal-box, assisted by the inclined position of the fire-bars and coal-plate, as shewn in Figure 2,
20 will partially supply the furnace with fresh fuel; and any further desirable quantity may be introduced by using a pushing rake from below through the narrow slits or openings in the lower part of the coal-plate, which may be worked either by hand or by machinery, and the prongs of which rake should be about four inches long, so as to project upwards only about three inches
25 above the coal-plate, by which means, in conjunction with the arrangement and contrivances before described, the fresh coal is introduced from the coal-box C into the furnace F in a thin layer or stratum of a few inches thick underneath the ignited coal already in the furnace, as exhibited in Figure 2, the ignited coal being coloured red and the fresh coal black, this process
30 and arrangement preventing in a great measure the nuisance of smoke, and by the more complete combustion of the gaseous and bituminous portions of the coal, effecting a saving in the consumption of fuel.

Now, in this my Specification I do not claim as my Invention inclined fire-bars or a coal-box or hopper behind to facilitate the introduction of fuel; but I
35 claim the particular construction and apparatus described, by which the coal or fuel is introduced in a thin stratum, in the manner described, behind and below the outer casing of the back part of the furnace or fire-box, by which means I avoid the necessity of separators, partitions, or reflectors in the interior area of the furnace, the whole of which area is left open and unincum-

Booth's Improvements in Steam Boiler-Furnaces.

bered (as much so as in an ordinary boiler-furnace) for the reception of fuel and the purposes of combustion. And although I have referred more especially to locomotive engine furnaces, it is evident that the improvements here specified are applicable to stationary boiler furnaces in a similar manner, and with a similar result, and I claim such application accordingly. 5

In witness whereof, I, the said Henry Booth, have hereunto set my hand and seal, the Twenty-seventh day of September, in the year of our Lord One thousand eight hundred and thirty-seven.

H^y BOOTH. (L.S.)

AVISON, J^r, Extra.

AND BE IT REMEMBERED, that on the Twenty-seventh day of Sep- 10
tember, in the year of our Lord 1837, the aforesaid Henry Booth came before our said Lady the Queen in Her Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose. 15

Inrolled the Fourth day of October, in the year of our Lord One thousand eight hundred and thirty-seven.

LONDON:

Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1855.